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Case Report

Comparative Analysis of Post-mortem CT and Autopsy Findings in Abdominal Trauma- A Case Report

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Abstract

Introduction: Medico legal autopsy plays an important role in cases of unnatural death. The opinion framed after the autopsy helps the investigative agency to solve the crime. The value of detailed post-mortem examination findings is significant for the Indian Medico legal System. Maintaining the sensitivity and specificity of the examination methods is crucial. **Case report:** A 50-year-old male body was received for post-mortem examination with a history of assault. Before starting a conventional autopsy, PMCT was performed by the Faculty of Radiology. After the PMCT, we performed a conventional post-mortem examination. Here, we compared the findings of both PMCT and conventional autopsies. **Discussion:** Despite being the world's largest democracy, our country's healthcare sector remains inaccessible to the less affluent population. The government endeavours to extend its reach through limited resources. Ironically, some prominent institutions recommend that the central government mandate the establishment of PMCT facilities across the nation, even though they are not considered the optimal standard. Diagnostic services such as CT and MRI are unavailable for many people in India, so how can authorities establish PMCT facilities? **Conclusion:** Understanding the strengths and limitations of newer post-mortem techniques is important. We cannot discard any old methods and adopt a new technique only in the name of advancement.

1. Introduction

Cases involving traumatic deaths require a thorough examination to determine the cause and nature of the injuries.[1] This is important for both legal and medical purposes. Post-mortem imaging, such as computed tomography (CT), is becoming increasingly valuable in providing detailed insights into the extent and characteristics of traumatic injuries.[2] Accurate evaluation of chest and

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abdominal wounds is crucial for determining the cause and manner of death, particularly in forensic investigations.[3,4] While conventional autopsy is still considered the most reliable method for post-mortem examination, post-mortem computed tomography (PMCT) has shown significant potential in improving the visualisation of internal injuries and facilitating the forensic evaluation of trauma-related deaths.[5]

In India, providing basic healthcare support is a significant challenge for both central and state governments. The healthcare system is characterized by a mix of public and private providers, with the government playing a crucial role in service delivery. While forensic experts widely endorse virtual autopsy/PMCT, India's lack of infrastructure, financing, and a shortage of specialists and insurance coverage raise doubts about the feasibility of establishing PMCT facilities nationwide. Although the system faces several obstacles such as inadequate financing, inadequate infrastructure, shortage of healthcare specialists, and limited insurance coverage, the question of establishing a CT scan facility for post-mortem purposes arises.[6,7] In this case report, we aimed to compare the findings of post-mortem CT with those of conventional autopsy methods for assessing blunt trauma to the chest and abdomen. By conducting a comparative analysis of post-mortem CT and conventional autopsy findings, we sought to shed light on the potential benefits and limitations of post-mortem imaging in evaluating blunt-force injuries of the chest and abdomen. Understanding the strengths and weaknesses of these two approaches can ultimately contribute to improving the accuracy and reliability of forensic assessments in cases of traumatic deaths.

2. Case Report-

The deceased, a 50-year-old individual, was brought to the Forensic Medicine department by the police for post-mortem examination. According to previous reports, the individual sustained multiple injuries to the chest and abdomen due to assault using a wooden stick. Before the standard autopsy procedure, a non-contrast, thin, contagious helical MDCT scan of the chest and abdomen was performed using a GE Optima 128 slice CT scanner. The findings showed evidence of a fracture in the left 7th, 8th, and 9th ribs, accompanied by mild-to-moderate free fluid in the peritoneal cavity, particularly in the splenorenal area. In addition, the fracture caused splenic splitting (**Fig 1**).

Fig 1- Spleen splitting on PMCT.

Fig 2- Inverted Y-shaped incision.

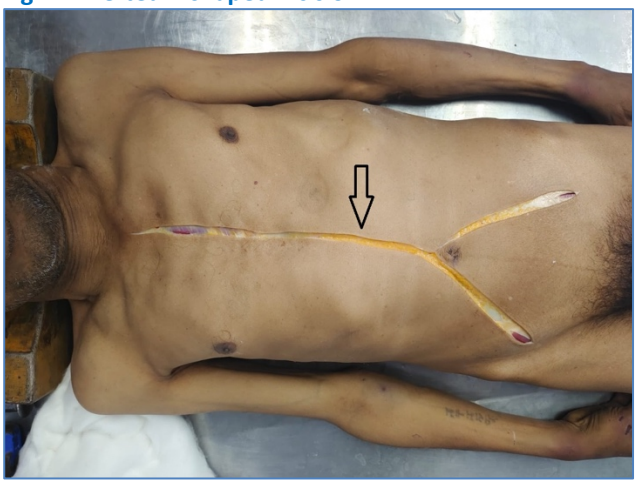
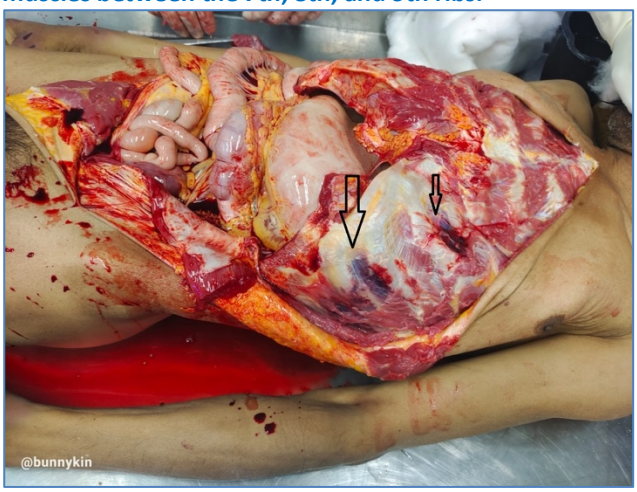


Fig 3- Blood extravasation surrounds the intercostal muscles between the 7th, 8th, and 9th ribs.



In the conventional autopsy, a 5 × 3 cm bruise was observed on the left lower lateral region of the chest, specifically at the 7th, 8th, and 9th ribs along the anterior axillary line. To enhance visualization of internal injuries in the lower chest and abdomen, an inverted "Y" shaped incision is made on the skin (**Fig 2**). An area of blood extravasation surrounding the

intercostal muscles between the 7th, 8th, and 9th ribs was observed, accompanied by fractures of the corresponding ribs along the anterior axillary line (Fig 3). Further investigation revealed a diaphragmatic laceration underneath the fracture site extending to the spleen (Fig 4). As a result of the laceration of the spleen, 1700 ml of blood was found in the peritoneal cavity (Fig 5).

Fig 4- Diaphragmatic laceration underneath the fracture site.

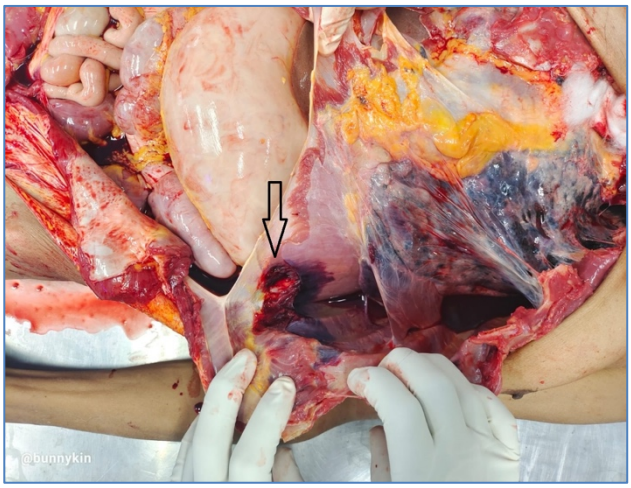
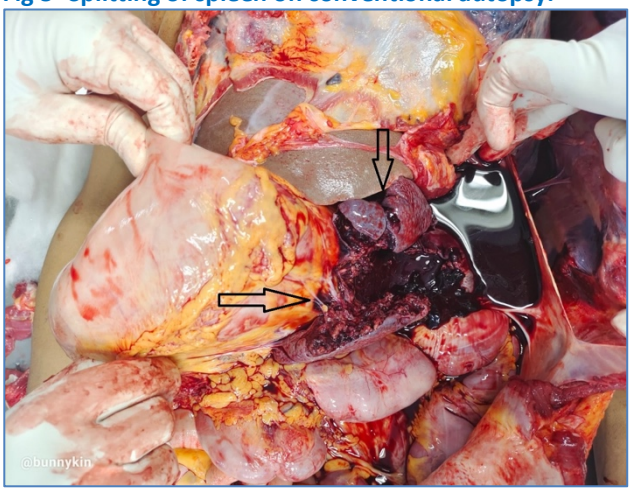


Fig 5- Splitting of spleen on conventional autopsy.



The final cause of death opined as 'Injury sustained to chest and abdomen as a result of blunt force impact leading to hypovolemic shock". PMCT was performed by Professor and Head of the Radiology Department, accompanied by a Senior Resident from the same department. In contrast, an Associate Professor and a final-year Resident of the Forensic Medicine department conducted Conventional Post-mortem examinations.

3. Discussion-

Interestingly, despite being the world's largest democracy, Indian states spend only about 1% of their net state domestic product on public healthcare, which is below the world average. This results in high out-of-pocket healthcare expenses and poor health outcomes. However, political competition in a democratic setup such as India is believed to drive governments to increase spending on public healthcare to win elections, as evidenced by empirical analysis.[6] Providing essential healthcare services in countries such as India is challenging for the central and State Governments. To overcome these challenges, Niti Ayog and the WHO developed policies for establishing a public-private partnership model to inculcate various diagnostic services, including CT scans, across India.[7] Conversely, several top institutions in India have advocated virtual autopsy/PMCT over conventional autopsy methods, and have suggested that all medical colleges and institutes nationwide adopt this approach. They also recommended that the Apex body, the National Medical Council (NMC), and other institutes of national importance should propose this as a compulsory curriculum, aiming to make it mandatory for all medical colleges.[9,10] Virtual autopsy, also known as PMCT, is increasingly being recognized as a valuable tool in forensic medicine. It is a non-invasive alternative to conventional autopsy, providing detailed insights into the cause of death through advanced imaging techniques. Studies have shown that PMCT can improve the diagnosis of the traumatic causes of death. Moreover, virtual autopsies can reveal findings such as air embolism and wound tracks, which might be challenging to visualize in a traditional autopsy.[11,12] However, a virtual autopsy may not always substitute a traditional autopsy because of its inability to perform histopathological and microbiological examinations, which are crucial for specific diagnoses.[13] There are various advanced techniques and innovations are important in future development of Forensic Medicine.[14-16]

The Effectiveness of PMCT varies depending on the nature of the case, such as being more consistent with traditional autopsies in traffic accidents but limited in cases of sudden cardiac death.[17,18] In the present case of a road traffic accident, even though PMCT was conducted by the senior faculty of the radiology department, it failed to detect laceration of the diaphragm and the presence of 1700 ml of blood in the peritoneal cavity.

4. Conclusion-

Virtual autopsies offer a promising alternative to traditional methods, although they

encounter financial and diagnostic challenges. They can be particularly useful as complementary tools or preliminary steps before conventional autopsies are conducted. To realize the full potential of virtual autopsies, it is essential to recognize their advantages and constraints and integrate them into a comprehensive diagnostic approach rather than treating them as an independent method.

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